SCRAMBLED CODE LETTERS FOR PROGRESS REPORT 50

PROJECT 1108-17, SEPTEMBER 1, 1959

Company - Mill	Machine No.	Code Letter
The Chesapeake Corporation - West Point	1	--
Continental Can Company, Inc. - Hopewell	1	D
Gaylord Container Corporation - Bogalusa	4	F
International Paper Company		
Bastrop	1	H
Bastrop	2	--
Georgetown	1	M
Georgetown	2	--
The Mead Corporation		
Sylva	1	J
Lynchburg	2	A
Harriman	1	L
Muskingum Fibre Products Company - Coshocton	1	B
North Carolina Pulp Company - Plymouth	3	Q
Olin Mathieson Chemical Corporation		
Monroe	1	--
Monroe	2	--
Owens-Illinois Glass Company		
Tomahawk	1	N
Tomahawk	2	C
Tomahawk	3	P
Big Island	1	R
Big Island	2	I
St. Joe Paper Company - Port St. Joe	1	K
Union Bag-Camp Paper Corporation - Savannah	2	G
West Virginia Pulp and Paper Company		
Covington	6	E
Covington	7	--
Hinde and Dauch of Canada (Tronton)	1	O
Charleston	--	--

THE INSTITUTE OF PAPER CHEMISTRY

Appleton, Wisconsin

SUPPLEMENTARY REPORT ON CALIPER OF SINGLE-FACED BOARD

Project 1108-17

Progress Report 50

to

FOURDRINIER KRAFT BOARD INSTITUTE, INC.

September 1, 1959

THE INSTITUTE OF PAPER CHEMISTRY

Appleton, Wisconsin

This report is supplementary to Progress Report 49 of the baseline study on corrugating medium entitled, "Continuous evaluation of corrugating medium" which provides a program whereby participation mills have the opportunity to submit rolls of medium on a regular weekly schedule for evaluation with regard to physical characteristics of the medium and of the single-faced board made from the medium. Specifically, each medium is evaluated for caliper, basis weight, and Concora flat crush. In addition each medium is fabricated into A-flute single-faced corrugated board on the Institute's corrugator to determine its runability in terms of speed and tension, and the single-faced board obtained at maximum speed with minimum tension is evaluated for its flat crush strength.

This report is an extension of the baseline study and is concerned specifically with the caliper and uniformity of caliper of the single-faced board fabricated from each roll of medium as described above. Uniformity of caliper is generally considered to be another facet of the criteria used to evaluate the runability of corrugating medium and the Technical Committee of the Fourdrinier Kraft Board Institute, Inc. has requested that a measurement of the uniformity of caliper be included as a part of the evaluation given each roll of corrugating medium.

The evaluation of the caliper and uniformity of caliper of the single-faced board made from each roll of corrugating medium was carried out by cutring five circular specimens, each with an area of ten

square inches, at intervals of approximately two feet along the central portion of a strip of the single-faced board fabricated at maximum speed and minimum tension. On each of these five specimens, caliper measurement were made on six consecutive flutes and the caliper difference between consecutive flutes was calculated, there being five calculations of differences for each specimen. The thirty caliper measurements (six calipers on each of the five specimens) were averaged and are reported as the caliper for each sample of medium. Likewise, the twenty-five caliper differences between consecutive flutes (five caliper differences on each of the five specimens) were averaged and are reported for each sample of corrugating medium as the caliper difference between consecutive flutes.

The instrument for measuring the caliper of individual flutes of single-faced board consists of a bench type thickness gage with a presser foot 0.6 inch long and 3/8 inch wide and an anvil consisting of a plane rectangular surface 1-1/2 inches wide and 3 inches long. The presser foot is attached to a dial indicator which can be read to 0.0001 inch. The load on the presser foot is 100 $\pm$ 10 grams. A caliper determination is made by inserting each ten-square-inch circular specimen between the presser foot and the anvil so that the foot rests on the third or fourth flute from one end of the specimen without touching either of the adjacent flutes. The 3/8-inch width of the presser foot permits it to contact only one flute with ease. The specimen is pressed gently against the anvil, and the reading is then recorded. As mentioned previously, six consecutive flutes through the center of each specimen are calipered in this way. It should be emphasized that these calipers may not necessarily correspond

to regular caliper measurements because of differences in load and other variables.

Caliper data have been obtained on the single-faced board fabricated from each of the 93 rolls of corrugating medium which were submitted for evaluation during the month of August. Also included for purposes of convenient reference are the single-face flat crush and runability data. The current machine averages for each test are summarized in Table I for Machines A through R. A graphical presentation of the caliper data on the single-faced board is shown in Figure 1, and a similar presentation of the data on the caliper difference between consecutive flutes is given in Figure 2. The test results obtained on the individual rolls of medium submitted by each company are given in Tables II through XIX for Machines A through R, respectively.

It may be seen in Figure 1 and Table I that the average caliper results for the single-faced boards varied from a low value of 194.8 points for Machine K to a high value of 197.1 points for Machine A. Likewise, from the results given in Table I and Figure 2, it may be noted that the average caliper difference between consecutive flutes ranged from a minimum of 1.1 points for Machine R to a maximum of 2.5 points for Machine K. The majority of the machines were associated with average caliper differences of approximately 2 points. None of the differences obtained for the current period appear to be exorbitant.

TABLE I

SUMMARY OF CURRENT MACHINE AVERAGES
August, 1959

Machine	Number of Rolls	Caliper, points	Caliper Difference Between Consecutive Flutes, pt.	Single-Face Flat Crush, p.s.i.
A	4	197.1	1.9	32.6
B	4	196.3	2.0	36.0
C	4	195.7	2.1	35.6
D	4	196.1	1.5	35.4
E	6	196.0	1.9	33.2
F	2	195.4	2.0	34.9
G	8	196.6	1.7	35.7
H	10	196.4	2.2	39.0
I	3	195.4	1.7	32.8
J	2	196.2	2.2	32.4
K	6	194.8	2.5	31.8
L	4	197.0	1.5	30.8
M	8	195.9	1.8	37.3
N	6	195.7	1.8	34.0
O	8	196.2	1.4	34.0
P	5	195.4	1.8	37.3
Q	6	196.2	2.2	38.4
R	3	196.1	1.1	35.9
Total	93			

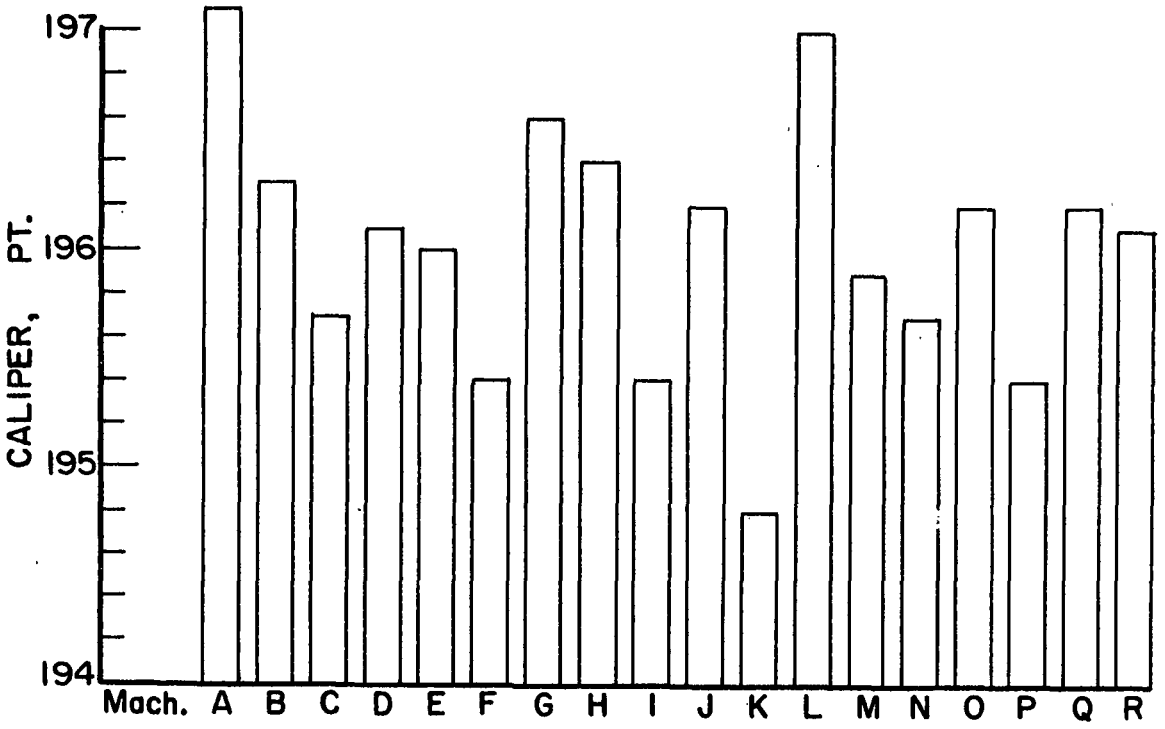

Figure 1
Comparison of Caliper Results on Single-Faced Board
August, 1959

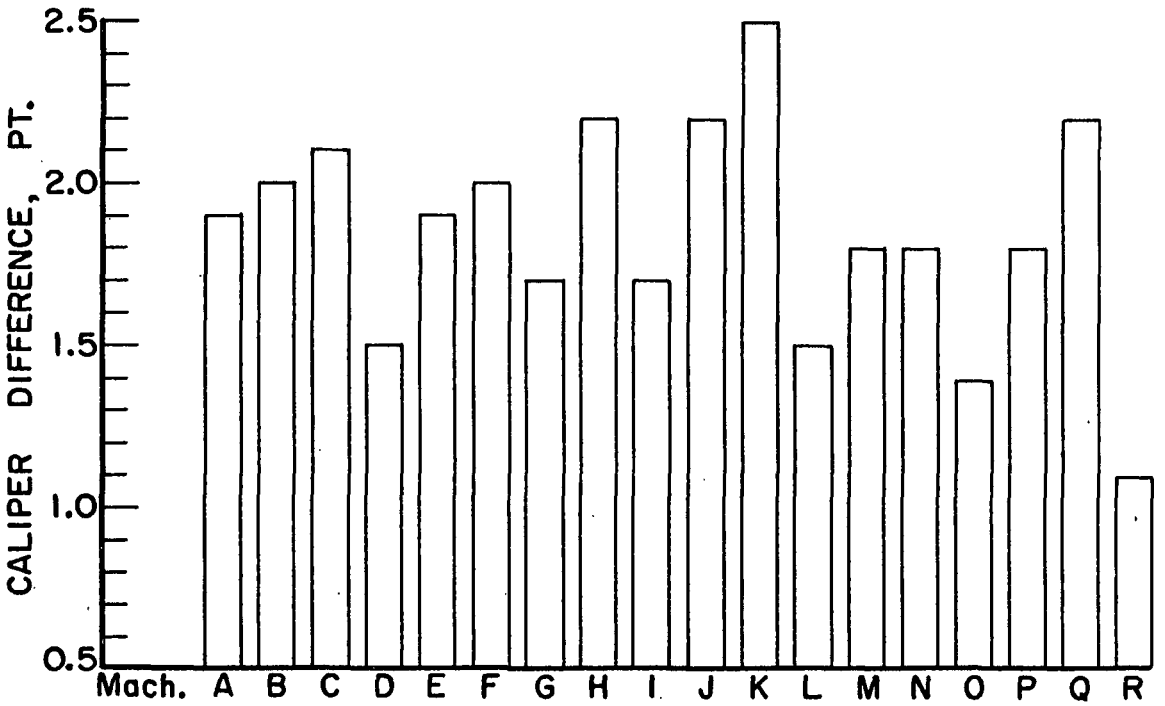

Figure 2
Comparison of the Caliper Differences Between Consecutive
Flutes of Single-Faced Board
August, 1959

TABLE II

SUMMARY OF TEST RESULTS FOR MACHINE A
August, 1959

Code	Date Made	Mill Roll No.	Caliper, pt.	Caliper Difference Between Consecutive Flutes, pt.	Single-Face Flat Crush, p.s.i.	Runability, (Maximum Tension at 600 f.p.m.,) lb./in.
A-1	7-25-59	163	197.8	2.4	32.8	1-1/2
A-2	7-25-59	164	196.4	1.6	34.1	1-1/2
A-3	8- 1-59	169	197.2	1.9	32.2	1-1/2
A-4	8- 1-59	170	197.1	1.8	31.2	1-1/2
Current Machine Average			197.1	1.9	32.6	

TABLE III

SUMMARY OF TEST RESULTS FOR MACHINE B
August, 1959

B-1	7-30-59	258	197.6	2.1	36.8	1-1/2
B-2	8- 3-59	259	197.5	2.3	34.2	1-1/2
B-3	8-11-59	260	194.6	1.4	36.8	1-1/2
B-4	8-13-59	261	195.4	2.1	36.2	1-1/2
Current Machine Average			196.3	2.0	36.0	

TABLE IV

SUMMARY OF TEST RESULTS FOR MACHINE C
August, 1959

C-1	7-21-59	3-C	196.4	2.0	34.4	1/2
C-2	7-23-59	3	195.7	2.1	35.5	1/2
C-3	7-24-59	5	195.3	2.2	35.8	1/2
C-4	7-24-59	7	195.4	2.2	36.6	min.
Current Machine Average			195.7	2.1	35.6	

TABLE V

SUMMARY OF TEST RESULTS FOR MACHINE D
August, 1959

Code	Date Made	Mill Roll No.	Caliper, pt.	Caliper Difference Between Consecutive Flutes, pt.	Single-Face Flat Crush, p.s.i.	Runability, (Maximum Tension at 600 f.p.m.,) lb./in.
D-1	7-17-59	189	197.6	1.4	35.2	min.
D-2	7-17-59	190	196.7	1.5	35.0	min.
D-3	7-24-59	191	195.0	1.7	32.6	1-1/2
D-4	7-30-59	192	195.1	1.5	38.8	1-1/2
Current Machine Average			196.1	1.5	35.4	

TABLE VI

SUMMARY OF TEST RESULTS FOR MACHINE E
August, 1959

E-1	7- 1-59	22	196.7	1.5	33.4	1/2
E-2	7- 6-59	23	195.8	2.2	32.6	1/2
E-3	7-11-59	24	196.5	1.5	33.2	1
E-4	7-20-59	25	195.2	2.6	34.3	1
E-5	7-23-59	26	195.9	1.4	32.7	1-1/2
E-6	7-23-59	27	195.7	2.3	33.2	1-1/2
Current Machine Average			196.0	1.9	33.2	

TABLE VII

SUMMARY OF TEST RESULTS FOR MACHINE F
August, 1959

F-1	7-17-59	1	195.0	1.6	35.0	1-1/2
F-2	7-21-59	2	195.9	2.4	34.8	1-1/2
Current Machine Average			195.4	2.0	34.9	

TABLE VIII

SUMMARY OF TEST RESULTS FOR MACHINE G
August, 1959

Code	Date Made	Mill Roll No.	Caliper, pt.	Caliper Difference Between Consecutive Flutes, pt.	Single-Face Flat Crush, p.s.i.	Runability, (Maximum Tension at 600 f.p.m.) lb./in.
G-1	7-19-59	300	198.7	2.3	33.4	min.
G-2	7-26-59	301	197.0	1.5	35.0	1-1/2
G-3	7-26-59	302	199.0	1.4	36.2	1-1/2
G-4	8- 2-59	303	195.6	1.2	37.5	1-1/2
G-5	8- 8-59	304	195.6	2.7	37.1	1-1/2
G-6	8- 9-59	305	196.1	1.8	34.6	1-1/2
G-7	8-16-59	306	195.2	1.4	33.9	1-1/2
G-8	8-17-59	307	195.5	1.5	37.8	1-1/2
Current Machine Average			196.6	1.7	35.7	

TABLE IX

SUMMARY OF TEST RESULTS FOR MACHINE H
August, 1959

H-1	7-22-59	--	195.9	2.5	37.9	1-1/2
H-2	7-24-59	489	195.6	2.6	39.4	1-1/2
H-3	7-28-59	490	196.0	1.3	41.3	1-1/2
H-4	7-29-59	--	196.8	2.0	38.1	1-1/2
H-5	7-31-59	491	197.2	1.8	40.3	1-1/2
H-6	8- 6-59	492	195.4	2.4	43.6	1-1/2
H-7	8- 7-59	493	195.2	1.8	39.0	1
H-8	8-10-59	494	195.1	1.6	38.3	1-1/2
H-9	8-14-59	495	199.3	2.9	35.5	1/2
H-10	8-18-59	496	197.1	2.6	36.9	1-1/2
Current Machine Average			196.4	2.2	39.0	

TABLE X

SUMMARY OF TEST RESULTS FOR MACHINE I
August, 1959

Code	Date Made	Mill Roll No.	Caliper, pt.	Caliper Difference Between Consecutive Flutes, pt.	Single-Face Flat Crush, p.s.i.	Runability (Maximum Tension at 600 f.p.m.) lb./in.
I-1	7-10-59	628	196.2	1.1	33.5	1-1/2
I-2	7-10-59	689	194.4	2.2	31.8	1-1/2
I-3	7-15-59	1161	195.7	1.8	33.0	1-1/2
Current Machine Average			195.4	1.7	32.8	

TABLE XI

SUMMARY OF TEST RESULTS FOR MACHINE J
August, 1959

J-1	8- 7-59	171	195.9	2.2	33.0	1
J-2	8-7- 59	172	196.6	2.3	31.9	1/2
Current Machine Average			196.2	2.2	32.4	

TABLE XII

SUMMARY OF TEST RESULTS FOR MACHINE K
August, 1959

K-1	7-21-59	23	197.6	2.3	33.2	1-1/2
K-2	7-21-59	24	196.9	2.0	32.9	1-1/2
K-3	8- 7-59	25	192.4	3.1	28.6	min.
K-4	8- 7-59	26	193.3	3.8	30.1	1/2
K-5	8- 8-59	27	194.4	1.8	33.3	1-1/2
K-6	8- 8-59	28	194.5	2.0	32.9	1-1/2
Current Machine Average			194.8	2.5	31.8	

TABLE XIII

SUMMARY OF TEST RESULTS FOR MACHINE L
August, 1959

Code	Date Made	Mill Roll No.	Caliper, pt.	Caliper Difference Between Consecutive Flutes, pt.	Single-Face Flat Crush, p.s.i.	Runability, (Maximum Tension at 600 f.p.m.) lb./in.
L-1	7-22-59	167	198.2	2.1	30.0	1/2
L-2	7-22-59	168	196.8	0.7	30.8	1-1/2
L-3	8-12-59	173	196.7	1.7	29.9	1/2
L-4	8-12-59	174	196.5	1.5	32.5	1/2
Current Machine Average			197.0	1.5	30.8	

TABLE XIV

SUMMARY OF TEST RESULTS FOR MACHINE M
August, 1959

M-1	7-14-59	331	195.5	1.7	35.0	min.
M-2	7-25-59	332	197.1	1.4	37.5	1-1/2
M-3	7-28-59	333	195.8	1.8	37.6	1
M-4	7-30-59	334	196.0	1.8	37.3	1-1/2
M-5	8- 3-59	335	196.6	1.8	36.8	1-1/2
M-6	8- 5-59	336	195.5	1.6	38.9	1-1/2
M-7	8-11-59	337	195.0	2.5	39.9	1-1/2
M-8	8-14-59	338	195.4	1.7	35.6	1-1/2
Current Machine Average			195.9	1.8	37.3	

TABLE XV

SUMMARY OF TEST RESULTS FOR MACHINE N
August, 1959

Code	Date Made	Mill Roll No.	Caliper, pt.	Caliper Difference Between Consecutive Flutes, pt.	Single-Face Flat Crush, p.s.i.	Runability, (Maximum Tension, at 600 f.p.m.) lb./in.
N-1	2-25-59	1-J-GL	196.1	2.5	32.9	1
N-2	2-26-59	1-K-HR	196.0	1.7	32.6	1/2
N-3	7-21-59	3-C	195.6	1.8	33.6	1
N-4	7-23-59	3	196.4	2.0	35.5	1/2
N-5	7-24-59	5	194.8	1.9	35.0	1
N-6	7-24-59	7	195.3	1.2	34.6	1
Current Machine Average			195.7	1.8	34.0	

TABLE XVI

SUMMARY OF TEST RESULTS FOR MACHINE O
August, 1959

O-1	--	82	196.5	0.9	34.1	1-1/2
O-2	--	83	197.0	1.3	33.5	1-1/2
O-3	--	84	197.6	1.3	32.0	1-1/2
O-4	--	85	197.1	1.3	33.4	1-1/2
O-5	--	91	195.4	1.6	35.2	1-1/2
O-6	--	92	195.8	1.9	35.0	1-1/2
O-7	--	93	195.2	1.5	34.1	1
O-8	--	94	195.3	1.2	34.7	1-1/2
Current Machine Average			196.2	1.4	34.0	

TABLE XVII

SUMMARY OF TEST RESULTS FOR MACHINE P
August, 1959

Code	Date Made	Mill Roll No.	Caliper, pt.	Caliper Difference Between Consecutive Flutes, pt.	Single-Face Flat Crush, p.s.i.	Runability, (Maximum Tension at 600 f.p.m.), lb./in.
P-1	5-18-59	3-EE	195.9	1.9	36.7	1
P-2	7-21-59	3-C	196.0	2.1	37.0	min.
P-3	7-23-59	3	194.8	1.4	37.4	1/2
P-4	7-24-59	5	195.6	2.0	39.2	1/2
P-5	7-24-59	7	194.9	1.6	36.2	1/2
Current Machine Average			195.4	1.8	37.3	

TABLE XVIII

SUMMARY OF TEST RESULTS FOR MACHINE Q
August, 1959

Q-1	7-14-59	182	196.7	1.0	35.5	1-1/2
Q-2	7-14-59	186	195.0	1.5	38.2	min.
Q-3	7-23-59	440	196.4	1.8	38.0	1
Q-4	7-29-59	632	197.9	3.5	40.3	Note a
Q-5	8- 7-59	194	196.2	2.2	38.8	Note b
Q-6	8-10-59	289	195.0	2.9	39.6	Note b
Current Machine Average			196.2	2.2	38.4	

TABLE XIX

SUMMARY OF TEST RESULTS FOR MACHINE R
August, 1959

R-1	7- 2-59	93	195.8	1.6	35.7	1-1/2
R-2	7- 7-59	380	196.2	0.9	35.0	1-1/2
R-3	7-16-59	1103	196.4	0.7	37.0	1
Current Machine Average			196.1	1.1	35.9	

[a] Maximum speed with minimum tension for this roll was 425 f.p.m.
[b] Maximum speed with minimum tension for this roll was 575 f.p.m.

THE INSTITUTE OF PAPER CHEMISTRY

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